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(54) Title: IMPROVING PHENOLIC DISINFECTANT CLEANING COMPOSITIONS WITH ALKYLPOLYGLUCOSIDE SURFACTANTS

(57) Abstract

An aqueous disinfectant cleaning composition incorporating an effective amount of a compound of the formula (I): $R\text{-}O(\text{-}G)_n$, wherein R is an alkyl group having from about 8 to about 22 carbon atoms, G is a saccharide residue having 5 or 6 carbon atoms; and n is a number from 1 to 10 into an aqueous composition which contains a phenolic compound having anti-bacterial activity selected from the group consisting of halo-substituted monohydric phenol compounds, halo-substituted dihydric phenol compounds, halo-substituted trihydric phenol compounds, halo-substituted hydroxybenzoic acids, and halo-substituted bis(hydroxyphenyl)alkanes, is provided. Also provided is a method of improving a disinfectant cleaning composition by incorporating an effective amount of an alkyl glycoside of formula (I) and a method of cleaning skin which employs such compositions.

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IMPROVING PHENOLIC DISINFECTANT CLEANING COMPOSITIONS WITH ALKYLPOLYGLUCOSIDE SURFACTANTS

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to compositions useful as disinfectant cleaning compositions, to a method for improving a disinfectant cleaning composition, and to the use of disinfectant cleaning compositions.

Background Art

Alkyl glycosides have been disclosed as potentiating agents for antiseptic biguanidine compounds as set forth in U.S. Patent No. 4,748,158 (Bierman et al.). The Bierman patent also discloses that investigations into the microbiological activities of alkyl glycosides have shown that they exhibit no significant antimicrobial activity even at concentrations as high as 10,000 ppm. Further, the Bierman patent discloses that combinations of alkyl glycosides with quaternary ammonium compounds are similarly undistinguished in their antimicrobial effect. While quaternary ammonium compounds exhibit bactericidal activity, their use with an alkyl glycoside surfactant, as described, for example, in U.S. Pat. No. 3,547,828, produces no increased or unexpected bactericidal effect. U.S. 4,834,903 teaches

compositions in which oxyalkylated long chain glycoside compositions are utilized in combination with one or more anionic, cationic or nonionic cosurfactant ingredients and/or with one or more detergent builder components.

Phenolic compounds are a known class of disinfectants. See e.g. "Disinfectants and Antiseptics", Encyclopedia of Chemical Technology, vol. 7, pp. 808-815 (Kirk-Othmer, eds., John Wiley & Sons, Inc. N.Y., N.Y., 3d ed. 1979). As this article states, phenol itself is of mostly historical interest or as a research tool in microbiology. The disinfectant art progressed to homologues of phenol, halogenated phenols, halogenated homologues, dihydric and trihydric phenols, hydroxybenzoic acids, bis(hydroxyphenyl)alkanes, and hydroxyquinolines. For example, 3,5-dimethyl-4-chlorophenol is discussed at pages 810 and 811 of that article and 2,4,4'-trichloro-2'-hydroxydiphenyl ether is discussed at page 812.

SUMMARY OF THE INVENTION

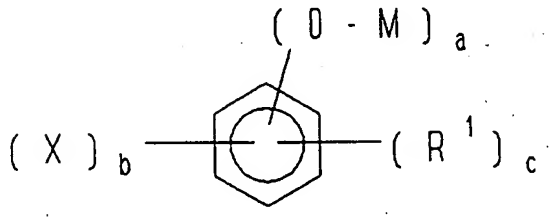
It has been found that an aqueous disinfectant cleaning composition can be improved by incorporating an effective amount of a compound of the formula I:

$$R\text{-}O(\text{-}G)_n$$

wherein R is an alkyl group having from about 8 to about 22 carbon atoms, G is a saccharide residue having 5 or 6 carbon atoms; and n is a number from 1 to 10, into an aqueous composition which contains a phenolic compound having anti-bacterial activity selected from the group consisting of halo-substituted monohydric phenol compounds, halo-substituted dihydric phenol compounds, halo-substituted trihydric phenol compounds, halo-substituted hydroxybenzoic acids, and halo-substituted bis(hydroxyphenyl)alkanes. Thus, this invention relates to compositions comprising a mixture of compounds of formula I and a phenolic compound as set forth herein. This invention also relates to a process of improving an aqueous cleaning composition comprising adding an effective amount of the compound of formula I to an aqueous composition comprised of a phenolic

compound as set forth herein. This invention also relates to a method of cleansing skin comprising contacting skin with an effective amount of the aqueous cleaning composition of this invention.

Preferred phenolic compounds have the formula II:



wherein:

R^1 is selected from the group consisting of an alkyl group having from about 1 to about 7 carbon atoms, an alkoxy group having from about 1 to about 7 carbon atoms, an aryl group having from about 6 to 10 carbon atoms, an aryloxy group having from about 6 to 10 carbon atoms, an aralkyl group having from about 6 to about 24 carbon atoms (e.g. a benzyl or C_{1-4} alkyl substituted benzyl group), an aralkoxy group having from about 6 to about 24 carbon atoms, an alkaryl group having from about 6 to about 24 carbon atoms and an alkaryloxy group having from about 6 to about 24 carbon atoms,

each X is independently a halogen selected from the group consisting of chlorine and bromine,

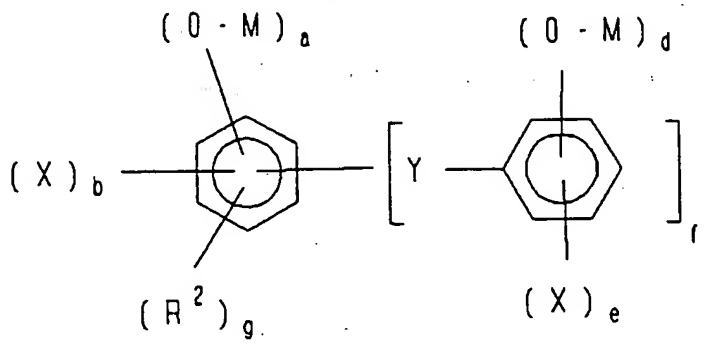
M is a counter-ion selected from the group consisting of hydrogen, alkali metals, alkaline earth metals and ammonium, and

a is 1, 2 or 3,

b is 1, 2, or 3, and

c is 1 or 2, provided the sum of a, b, and c may not exceed 6.

In particularly preferred compositions, the phenolic compound has the formula III:



wherein:

R^2 is selected from the same group as R^1, more preferably from the group consisting of an alkyl group having from about 1 to about 7 carbon atoms,

each X is independently a halogen selected from the group consisting of chlorine and bromine,

each M is a counter-ion selected from the group consisting of hydrogen, alkali metals, alkaline earth metals and ammonium,

Y is a linking group selected from the group consisting of oxygen and methylene, and

each of a and d is independently 1, 2, or 3, preferably a and d are both 1,

each of b and e is independently 1, 2, or 3,

f is 0 or 1, and

g is 0, 1 or 2, provided the sum of a, b, f, and g may not exceed 6 and the sum of d and e may not exceed 4.

Detailed Description of the Invention

Compounds of the formula I are commercial surfactants and are available, for example, from Henkel Corporation, Ambler, PA., 19002 under the trademark names APG®, Plantaren™, or Glucopon™. Examples of such surfactants include but are not limited to:

1. Glucopon™ 225 - an alkylpolyglycoside in which the alkyl group contains 8 to 10 carbon atoms.
2. APG® 325 - an alkyl polyglycoside in which the alkyl group contains 9 to 11 carbon atoms.
3. Glucopon™ 625 - an alkyl polyglycoside in which the alkyl groups contains 12 to 16 carbon atoms.
4. APG® 300 - an alkyl polyglycoside substantially the same as the 325 product above but having a different average degree of polymerization.
5. Glucopon™ 600 - an alkylpolyglycoside substantially the same as the 625 product above but having a different average degree of polymerization.
6. Plantaren® 2000 - a C_{8-16} alkyl polyglycoside.
7. Plantaren® 1300 - a C_{12-16} alkyl polyglycoside.
8. Plantaren® 1200 - a C_{12-16} alkyl polyglycoside.

Other examples include alkyl polyglycoside surfactant compositions which are comprised of mixtures of compounds of formula IV wherein G represents a moiety derived from a reducing saccharide containing 5 or 6 carbon atoms; n is a number from 1.0 to 3; and R is an alkyl radical having from 8 to 20 carbon atoms. The composition is characterized in that it has increased surfactant properties and an HLB in the range of about 10 to about 16 and a non-Flory distribution of glycosides, which is comprised of a mixture of an alkyl monoglycoside and a mixture of alkyl polyglycosides having varying degrees of polymerization of 2 and higher in progressively decreasing amounts, in which the amount by weight of polyglycoside having a degree of polymerization of 2, or mixtures thereof with the polyglycoside having a degree of polymerization of 3, predominate in relation to the

amount of monoglycoside, said composition having an average degree of polymerization of about 1.8 to about 3. Such compositions can be prepared by separation of the monoglycoside from the original reaction mixture of alkyl monoglycoside and alkyl polyglycosides after removal of the alcohol. This separation may be carried out by molecular distillation and normally results in the removal of about 70-95% by weight of the alkyl monoglycosides. After removal of the alkyl monoglycosides, the relative distribution of the various components, mono- and poly-glycosides, in the resulting product changes and the concentration in the product of the polyglycosides relative to the monoglycoside increases as well as the concentration of individual polyglycosides to the total, i.e. DP2 and DP3 fractions in relation to the sum of all DP fractions. Such compositions are disclosed in copending application serial number 07/810,588, filed on 12/19/91, the entire contents of which are incorporated herein by reference.

The skilled artisan may find it beneficial to use a mixture of compounds of the formula I in order to obtain a maximum improvement of a disinfectant cleaning composition. The preferred compounds of formula I are Glucopon™ 425 surfactant and Glucopon™ 625 surfactant. An effective amount of a compound of formula I is any amount which will increase the efficacy of a compound of formula II. The effective amount will typically be in the range of the ratio of a compound of formula I to phenolic compound of from 30:1 to 1:2, preferably from 20:1 to 2:1, and more preferably from 15:1 to 5:1.

The bactericidal compounds useful according to the invention are phenolic compounds. Representative examples of phenolic compounds, e.g. compounds within the scope of formula II, are disclosed in "Disinfectants and Antiseptics", Encyclopedia of Chemical Technology, vol. 7, pp. 808-815 (Kirk-Othmer, eds., John Wiley & Sons, Inc. N.Y., N.Y., 3d ed. 1979), the disclosure of which is incorporated herein by reference. As stated above, the compounds useful in this invention are selected from the group consisting of halo-substituted monohydric phenol compounds, halo-substituted dihydric phenol compounds, halo-substituted trihydric phenol

compounds, halo-substituted hydroxybenzoic acid compounds, and halo-substituted bis(hydroxyphenyl)alkane compounds.

By "halo-substituted" is meant that the compound has one or more halogen atoms, preferably chlorine or bromine, covalently bonded to the phenolic ring. The compounds may also have other substituents, e.g. alkyl groups, aralkyl groups, alkaryl groups, alkoxy groups, aryloxy groups, alkaryloxy groups, and aralkoxy groups. The terms dihydric phenol and trihydric phenol are meant to include both compounds wherein the hydroxyl groups of the compound are all on one phenyl group (e.g. a resorcinol derivative) and compounds wherein two or more hydroxyl groups are distributed among two or more phenyl groups in the compound (e.g. a hydroxyphenyl phenol derivative). The compounds can be in the free hydroxyl form or a salt thereof, e.g. sodium, calcium, or ammonium.

Examples of suitable phenolic compounds include but are not limited to halo-phenols, preferably ortho- or para-substituted (e.g. o-chlorophenol, p-chlorophenol, o-bromophenol, and p-bromophenol), alkyl-halo-phenols, for preferably C_1 to C_7 normal alkyl-substituted halo-phenols (e.g. 2-chloro-4-methyl-phenol, 4-chloro-2-methyl-phenol, 2-bromo-4-methyl-phenol, 4-bromo-2-methyl-phenol, 2-chloro-4-(n-heptyl)-phenol 4-chloro-3,5-dimethyl-phenol, and 4-chloro-3,5-di(n-heptyl)-phenol), aralkyl-halo-phenols, preferably benzyl-halo-phenols (e.g. p-chloro-o-benzyl-phenol), aryl-halo-phenols, preferably phenyl-halo-phenols (e.g. p-chloro-o-phenyl-phenol), dihydric phenols, preferably hydroxy-halo-phenyloxy-halo-phenols (e.g. 2,4,4'-trichloro-2'-hydroxydiphenyl ether) and bis(hydroxy-halo-phenyl)alkanes, preferably bis(hydroxy-halo-phenyl)methanes (e.g. 2,2'-methylenebis(4-chlorophenol) and 2,2'-methylenebis(3,4,6-trichlorophenol). The preferred compounds of formula II are 4-chloro-3,5-dimethyl-phenol and 2,4,4'-trichloro-2'-hydroxydiphenyl ether.

The amount of the phenolic compound typically in a disinfectant cleaning composition to be improved by incorporation of the compound of formula I will typically be from the weight ratio of a compound of formula I to phenolic compound of from 30:1 to 1:2, preferably 20::1 to 2:1, and

more preferably 10:0 to 5:1. The disinfectant cleaning compositions to be improved by incorporation of compound of the formula I can also contain other compounds normally used in such compositions such as builders, brighteners, emollients, moisturizers, etc. The aqueous compositions of this invention are advantageously used in personal care products, e.g. they are applied to, or otherwise contact, human skin. In such products, the major component on a weight basis is water (typically at least 60% by weight). The composition may be in the form of a concentrate (i.e only a minor amount by weight of water), which is diluted with water to form the final product. A preferred use of the compositions of this invention is in a liquid hand soap.

One preferred embodiment of the present invention is a process wherein in the compound of formula I R is a C_{8-16} alkyl group, G is a glucose residue, and n is 1.6. Another preferred embodiment of the present invention is a process wherein in the compound of formula I R is a C_{12-16} alkyl group, G is a glucose residue, and n is 1.6. The following examples are meant to illustrate but not limit the invention.

EXAMPLE 1

A disinfectant cleaning composition having the formulation set forth below was prepared by mixing the ingredients together. This composition contained the dihydric phenol 2,4,4'-trichloro-2'-hydroxydiphenyl ether (a.k.a. triclosan) as the active bactericidal ingredient and is labelled Sample A, below.

Alkylpolyglucoside was used to prepare an antibacterial liquid hand soap concentrate as shown below.

COMPOUNDS	Parts by weight
Sodium lauryl sulfate(Standapol WAQLC)	66.68
Alkylpolyglucoside (Glucopon-625)	15.68
Coconut Betaine (Velvetex BA-35)	11.76
Triclosan (Irgasan DP 300)	1.96
Propylene Glycol	0.98
Glycerine	0.98
Sodium Chloride	1.96
	100.8

From the above concentrate formulation, an antibacterial liquid hand soap was made as shown below.

COMPONENTS	PARTS BY WEIGHT
Concentrate from above	25
Deionized Water	72.8
25% Sodilum Chloride Solution	2.2
	100

The liquid hand soap composition (the concentrate diluted as shown above) was then tested side-by-side with a commercially available liquid hand soap, denoted as Sample B, below, (containing 0.19% of the active ingredient triclosan and presumably having a different formulation with respect to the other ingredients) for their ability to inhibit the growth of the test organisms Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa, as follows. (It should be noted that the composition of Sample B was unknown with the exception of the percent of an active ingredient.)

Test cultures of each organism were prepared by incubating at 35°C in Tryptic Soy Broth for 24 hours. Stock dilutions of each test sample were prepared by making an initial 2% dilution (weight/volume) in sterile distilled

water. This was then subjected to "doubling dilutions" in sterile distilled water, to yield 2%, 1%, 0.5%, 0.25%, 0.125%, 0.063%, 0.031% and 0.016%. These stock dilutions were respectively labelled 20000, 10000, 5000, 1250, 625, 313, and 156 parts per million (ppm).

Test systems were then prepared for each organisms. These consisted of test tubes containing 9 ml of the same media as that used for culture preparation. Addition of 1 ml of the stock dilutions to these tubes yielded in-test concentrations of one-tenth the stock dilution concentrations, or 2000, 1000, 5000, 250, 125, 62.5,, 31.3, and 15.6 ppm. One ml of sterile distilled water was added to an additional 9 ml tube of media, to serve as a positive growth control (labelled "0 ppm").

Finally, one drop (from a sterile pipette) of the test cultures/ suspensions were added to the test systems, and incubated. At the conclusion of the incubation period, the tubes were observed for growth.

The results of the tests are as set forth in Table 1, below.

Table 1

	Microbiological Recovery					
	Sample A			Sample B		
	Sa[1]	Ec[2]	Pa[3]	Sa	Ec	Pa
0	+ +	+ +	+ +	+ +	+ +	+ +
15.6	+	+ +	+ +	+	+ +	+ +
31.35	+	+	+ +	+	+ +	+ +
62.5	±	±	+ +	+	+ +	+ +
125	--	±	+ +	--	+ +	+ +
250	--	--	+ +	--	+ +	+ +
500	--	--	+ +	--	+ +	+ +
1000	--	--	+ +	--	--	+ +
2000	--	--	+ +	--	--	+ +

Sa is S. aureus
Ec is E. coli
Pa is P. aeruginosa
+ + is heavy growth
+ is growth
± is little growth
-- is no growth

EXAMPLE 2

A disinfectant cleaning composition having the formulation set forth above was tested in a different protocol side-by-side with a second sample of the liquid hand soap of Sample B, and a sample of a second commercially available liquid hand soap denoted below as Sample C (containing 0.26% of the active ingredient triclosan and presumably having a different formulation with respect to the other ingredients) for their ability to inhibit the growth of the test organisms Staphylococcus aureus and Kleb. pneumoniae as

follows. (It should be noted that the composition of Samples B and C was unknown with the exception of the percent of an active ingredient of each.)

The method employed was a suspension/challenge - serial dilution/viable cell count. An inoculum was prepared by mixing 0.25 mls. of a 24 hour broth culture with 9.75 mls. of sterile distilled water. A baseline count was determined by performing a serial dilution/viable cell count on the inoculum/test formulation mixture. One ml of inoculum was added to 9 mls. of test formulation and mixed with a glass rod; followed by a viable cell count performed after 120 seconds of contact time. Serial dilutions and subsequent plate counts were performed in broth and agar, respectively, containing triclosan neutralizing ingredients (polysorbate 80 and lecithin, available as Lethee broth and agar from Difco) in order to differentiate between cidal and static antibacterial activity. The viable cell counts (vcc or colony forming units) for each test organism, after 120 seconds of contact time, were compared to a baseline count in order to calculate a reduction factor (RF). The RF is expressed in log and percent reductions.

TABLE 2

Samples	Organism	vcc/ml:		RF:
		Baseline	120 Seconds	Log/(%)
A	Sa	3,900,000	12,250	2.51/(99.68)
B	Sa	3,900.00	5,800	2.83/(99.85)
C	Sa	3,900,00	<100	>4.59/(99.99)
A	Kp	6,400.000	660,000	0 .99/(89.6)
B	Kp	6,400.000	1,625,000	0.59/(74.6)
C	Kp	6,400,00	1,800,000	0.55/(71.8)

EXAMPLE 3

A disinfectant cleaning composition having the formulation set forth below was prepared by mixing the ingredients together. This composition contained the monohydric phenol 4-chloro-3,5-dimethyl-phenol (a.k.a. p-chloro-meta-xylenol) as the active bactericidal ingredient.

Alkylpolyglucoside was used to prepare an antibacterial liquid hand soap concentrate as shown below.

COMPOUNDS	Parts by weight
Sodium lauryl sulfate(Standapol WAQLC)	66.68
Alkylpolyglucoside (Glucopon-625)	15.68
Coconut Betaine (Velvetex BA-35)	11.76
4-chloro-3,5-dimethyl-phenol	1.96
Propylene Glycol	0.98
Glycerine	0.98
Sodium Chloride	1.96
	100.8

From the above concentrate formulation, an antibacterial liquid hand soap was made as shown below.

COMPONENTS	PARTS BY WEIGHT
Concentrate from above	25
Deionized water	72.8
25% Sodium Chloride Solution	2.2
	100.0

What is claimed is:

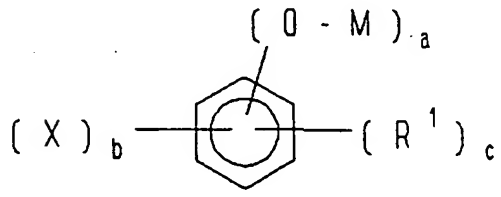
1. A composition useful as a disinfectant cleaning composition comprising:

an effective amount of a compound of the formula I:

$$R\text{-}O(\text{-}G)_n$$

wherein R is an alkyl group having from about 8 to about 22 carbon atoms, G is a saccharide residue having 5 or 6 carbon atoms; and n is a number from 1 to 10, and an effective amount of a phenolic compound having anti-bacterial activity selected from the group consisting of halo-substituted monohydric phenol compounds, halo-substituted dihydric phenol compounds, halo-substituted trihydric phenol compounds, halo-substituted hydroxybenzoic acids, and halo-substituted bis(hydroxyphenyl)alkanes.

2. A composition of claim 1 wherein said phenolic compound has the formula II:



wherein:

R^1 is selected from the group consisting of an alkyl group having from about 1 to about 7 carbon atoms, an alkoxy group having from about 1 to about 7 carbon atoms, an aryl group having

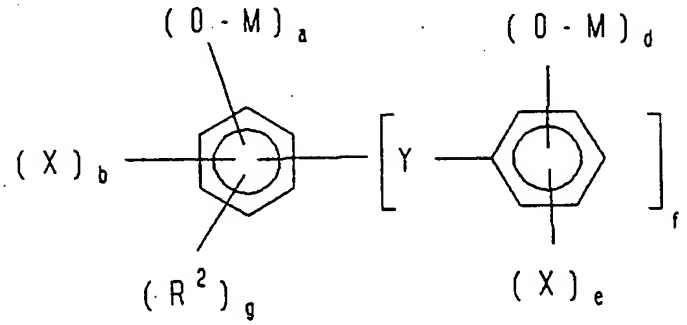
from about 6 to about 10 carbon atoms, an aryloxy group having from about 6 to about 10 carbon atoms, an aralkyl group having from about 6 to about 24 carbon atoms, an aralkoxy group having from about 6 to about 24 carbon atoms, an alkaryl group having from about 6 to about 24 carbon atoms and an alkaryloxy group having from about 6 to about 24 carbon atoms,

each X is independently a halogen selected from the group consisting of chlorine and bromine,

M is a counter-ion selected from the group consisting of hydrogen, alkali metals, alkaline earth metals and ammonium, and

a is 1, 2 or 3, b is 1, 2, or 3, and c is 1 or 2, provided the sum of a, b, and c may not exceed 6.

3. A composition of claim 1 wherein said phenolic compound has the formula III:



wherein:

R^2 is selected from the group consisting of an alkyl group having from about 1 to about 7 carbon atoms, an alkoxy group having from about 1 to about 7 carbon atoms, an aryl group having from about 6 to 10 carbon atoms, an aryloxy group having from

about 6 to 10 carbon atoms, an aralkyl group having from about 6 to about 24 carbon atoms, an aralkoxy group having from about 6 to about 24 carbon atoms, an alkaryl group having from about 6 to about 24 carbon atoms and an alkaryloxy group having from about 6 to about 24 carbon atoms,

each X is independently a halogen selected from the group consisting of chlorine and bromine,

each M is a counter-ion selected from the group consisting of hydrogen, alkali metals, alkaline earth metals and ammonium,

Y is a linking group selected from the group consisting of oxygen and methylene, and

each of a and d is independently 1, 2, or 3, preferably a and d are both 1,

each of b and e is independently 1, 2, or 3,

f is 0 or 1, and

g is 0, 1 or 2, provided the sum of a, b, f, and g may not exceed 6 and the sum of d and e may not exceed 4.

4. A composition of claim 3 wherein R^2 is selected from the group consisting of an alkyl group having from about 1 to about 7 carbon atoms

5. A composition of claim 3 wherein in said compound of formula I, R is an alkyl group having from 8 to 22 carbon atoms, G is a glucose residue and n is from 1 to 3.

6. A composition of claim 1 wherein said phenolic compound is selected from the group consisting of halo-substituted monohydric

phenol compounds, halo-substituted dihydric phenol compounds, and halo-substituted trihydric phenol compounds.

7. A composition of claim 1 wherein said phenolic compound is 4-chloro-3,5-dimethyl-phenol.

8. A composition of claim 1 wherein said phenolic compound is 2,4,4'-trichloro-2'-hydroxydiphenyl ether.

9. A composition of claim 1 wherein in said compound of formula I, R is an alkyl group having from 8 to 22 carbon atoms, G is a glucose residue and n is from 1 to 3.

10. A composition of claim 9 wherein said phenolic compound is 2,4,4'-trichloro-2'-hydroxydiphenyl ether.

11. A composition of claim 1 wherein in said compound of formula I R is a C_{8-16} alkyl group, G is a glucose residue, and n is 1.6.

12. A composition of claim 1 wherein in said compound of formula I R is a C_{12-16} alkyl group, G is a glucose residue, and n is 1.6.

13. A composition of claim 12 wherein said phenolic compound is 2,4,4'-trichloro-2'-hydroxydiphenyl ether.

14. A composition of claim 13 wherein the weight ratio of said compound of formula I to said phenolic compound is from about 30:1 to about 1:2.

15. A composition of claim 1 wherein the weight ratio of said compound of formula I to said phenolic compound is from about 30:1 to about 1:2.

16. A composition of claim 1 further comprising a major amount by weight of water.

17. A composition of claim 1 further comprising a minor amount by weight of sodium chloride.

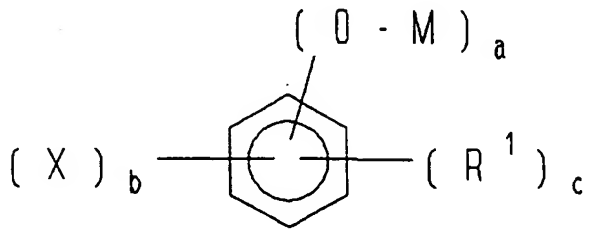
18. A process for improving an aqueous disinfectant cleaning formulation which comprises adding to said aqueous disinfectant cleaning formulation an effective amount of a compound of the formula I

$$R\text{-}O(\text{-}G)_n$$

wherein R is an alkyl group having from about 8 to about 22 carbon atoms, G is a saccharide residue having 5 or 6 carbon atoms; and n is a number from 1 to 10; wherein said formulation is comprised of a phenolic compound having anti-bacterial activity selected from the group consisting of halo-substituted monohydric phenol compounds, halo-substituted dihydric phenol compounds, halo-substituted

trihydric phenol compounds, halo-substituted hydroxybenzoic acids, and halo-substituted bis(hydroxyphenyl)alkanes.

19. A process of claim 16 wherein said phenolic compound has the formula II:



wherein:

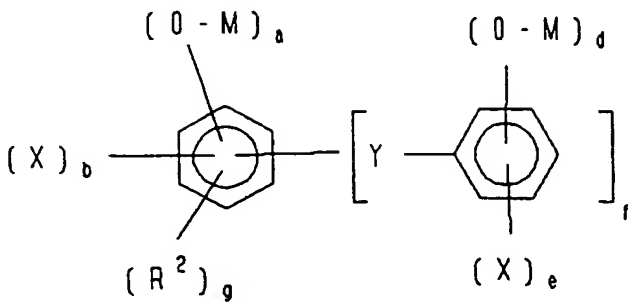
R^1 is selected from the group consisting of an alkyl group having from about 1 to about 7 carbon atoms, an alkoxy group having from about 1 to about 7 carbon atoms, an aryl group having from about 6 to 10 carbon atoms, an aryloxy group having from about 6 to 10 carbon atoms, an aralkyl group having from about 6 to about 24 carbon atoms (e.g. a benzyl or C_{1-4} alkyl substituted benzyl group), an aralkoxy group having from about 6 to about 24 carbon atoms, an alkaryl group having from about 6 to about 24 carbon atoms and an alkaryloxy group having from about 6 to about 24 carbon atoms,

each X is independently a halogen selected from the group consisting of chlorine and bromine,

M is a counter-ion selected from the group consisting of hydrogen, alkali metals, alkaline earth metals and ammonium, and

a is 1, 2 or 3, b is 1, 2, or 3, and c is 1 or 2, provided the sum of a, b, and c may not exceed 6.

20. A process of claim 16 wherein said phenolic compound has the formula III:



wherein:

R^2 is selected from the group consisting of an alkyl group having from about 1 to about 7 carbon atoms, an alkoxy group having from about 1 to about 7 carbon atoms, an aryl group having from about 6 to 10 carbon atoms, an aryloxy group having from about 6 to 10 carbon atoms, an aralkyl group having from about 6 to about 24 carbon atoms, an aralkoxy group having from about 6 to about 24 carbon atoms, an alkaryl group having from about 6 to about 24 carbon atoms and an alkaryloxy group having from about 6 to about 24 carbon atoms,

each X is independently a halogen selected from the group consisting of chlorine and bromine,

each M is a counter-ion selected from the group consisting of hydrogen, alkali metals, alkaline earth metals and ammonium,

Y is a linking group selected from the group consisting of oxygen and methylene, and

each of a and d is independently 1, 2, or 3, preferably a and d are both 1,

each of b and e is independently 1, 2, or 3,

f is 0 or 1, and

g is 0, 1 or 2, provided the sum of a, b, f, and g may not exceed 6 and the sum of d and e may not exceed 4.

21. A process of claim 18 wherein R^2 is selected from the group consisting of an alkyl group having from about 1 to about 7 carbon atoms.

22. A process of claim 18 wherein in said compound of formula I, R is an alkyl group having from 8 to 22 carbon atoms, G is a glucose residue and n is from 1 to 3.

23. A process of claim 16 wherein said phenolic compound is selected from the group consisting of halo-substituted monohydric phenol compounds, halo-substituted dihydric phenol compounds, and halo-substituted trihydric phenol compounds.

24. A process of claim 16 wherein said phenolic compound is 4-chloro-3,5-dimethyl-phenol.

25. A process of claim 16 wherein said phenolic compound is 2,4,4'-trichloro-2'-hydroxydiphenyl ether.

26. A process of claim 16 wherein in said compound of formula I, R is an alkyl group having from 8 to 22 carbon atoms, G is a glucose residue and n is from 1 to 3.

27. A process of claim 24 wherein said phenolic compound is 2,4,4'-trichloro-2'-hydroxydiphenyl ether.

28. A process of claim 16 wherein in said compound of formula I R is a C_{8-16} alkyl group, G is a glucose residue, and n is 1.6.

29. A process of claim 16 wherein in said compound of formula I R is a C_{12-16} alkyl group, G is a glucose residue, and n is 1.6.

30. A process of claim 27 wherein said phenolic compound is 2,4,4'-trichloro-2'-hydroxydiphenyl ether.

31. A process of claim 28 wherein the weight ratio of said compound of formula I to said phenolic compound is from about 30:1 to about 1:2.

32. A process of claim 16 wherein the weight ratio of said compound of formula I to said phenolic compound is from about 30:1 to about 1:2.

33. A process of claim 16 wherein said aqueous disinfectant cleaning composition is comprised of a major amount by weight of water.

34. A process of claim 16 wherein said aqueous disinfectant cleaning composition is comprised of a minor amount by weight of sodium chloride.

35. A method of cleansing skin comprising contacting skin with an effective amount of an aqueous cleaning composition of claim 1.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/10911

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A61K 7/50; C11D 1/66, 3/04, 3/22, 3/24, 3/48, 17/08

US CL :252/106, 173, 174.17

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 252/106, 173, 174.17

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 5,057,311 [KAMEGAI] 15 October 1991 See Examples 6 and 8.	1, 3-6, 8-18, 20-23 and 25-35
Y	US, A, 4,440,661 [TAKEUCHI] 03 April 1984 See Col. 4, lines 44-49.	2, 7, 19 and 24
Y	EP, A, 0 086 878 [GARABEDIAN] 31 August 1983 See the abstract and the claims.	2, 7, 19 and 24

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 DECEMBER 1994	JAN 27 1995

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